



Additions to the list of Finnish Bibionomorpha (Diptera, Nematocera)

Jukka Salmela[‡], Kari M Kaunisto[§]

[‡] Parks & Wildlife Finland (Metsähallitus), Rovaniemi, Finland

[§] Zoological Museum, Department of Biology, University of Turku, Turku, Finland

Corresponding author: Jukka Salmela (jukka.e.salmela@gmail.com)

Academic editor: Vladimir Blagoderov

Received: 01 May 2015 | Accepted: 20 Jun 2015 | Published: 25 Jun 2015

Citation: Salmela J, Kaunisto K (2015) Additions to the list of Finnish Bibionomorpha (Diptera, Nematocera).

Biodiversity Data Journal 3: e5228. doi: [10.3897/BDJ.3.e5228](https://doi.org/10.3897/BDJ.3.e5228)

Abstract

A total of 12 gnat species are reported for the first time from Finland (3 Cecidomyiidae, 1 Keroplatidae, 8 Mycetophilidae), and the occurrence of *Macrocera nigropicea* Lundström in Finland is verified. All material was collected from the Finnish Lapland, mainly from the north boreal ecoregion. Two of the recorded species are likely to be pyrophilous, associated with forest fire sites. A photo of the ventral appendage of the gonocoxite of *Brevicornu setigerum* Zaitzev is provided for the first time. The male hypopygium of *Mycetophila haruspica* Plassmann is redescribed.

Keywords

Cecidomyiidae, Lestremiinae, Porricondylinae, Keroplatidae, Mycetophilidae, gall midges, fungus gnats

Introduction

With over 52000 species globally, nematocerans or lower Diptera are one of the most species-rich insect groups in the world (Pape et al. 2009). Within Nematocera, the most

successful terrestrial group is the Bibionomorpha, including a majority of the saproxylic, fungivorous and herbivorous species (e.g. Mycetophilidae and Cecidomyiidae, Marshall 2012). As in many other biotic groups, Fennoscandian or North European bibionomorphans are perhaps the best known on the globe, especially regarding fungus gnats (or Sciaroidea, excluding Sciaridae). Despite the taxonomic and faunistic tradition starting from the 18th century (see Kjaerandsen et al. 2007b), species are continually added to the Nordic list (Søli and Rindal 2012, Jakovlev et al. 2014), including species new to science (e.g. Kjaerandsen et al. 2009, Salmela and Suuronen 2014, Kurina et al. 2015). No less than 915 fungus gnat species are currently known from the Nordic countries and Russian parts of Fennoscandia (Karelia and Murmansk oblast), consisting of approximately 83 % of the total European fungus gnat fauna (Kjaerandsen 2015). Nevertheless, at least 100 Fennoscandian fungus gnat species await formal naming and description (Kjaerandsen J., Polevoi A., Søli G., Salmela J., in prep.), raising the total number of species occurring in the area to around 1000. Non-herbivorous, or fungivorous and saproxylic gall midges (Cecidomyiidae) are far more poorly known than fungus gnats. In their recent monographs on the Nordic fauna, Mathias and Catrin Jaschhof (Jaschhof and Jaschhof 2009, Jaschhof and Jaschhof 2013) have described dozens of new species and have much advanced the faunistic knowledge on Lestremiinae and Porricondylinae. For example, the number of Finnish Cecidomyiidae have increased from 136 (Hackman 1980) to 356 (Jaschhof et al. 2014), mainly due to taxonomic and faunistic work performed during the last ten years. However, both Lestremiinae and Porricondylinae should still be considered as poorly known groups, and further additions to the Nordic and Finnish lists are expected.

A list of Finnish Diptera was recently published (Kahanpää and Salmela 2014). In the present paper, 12 species was added to this list (3 Cecidomyiidae, 1 Keroplatidae, 8 Mycetophilidae) and the occurrence of one keroplatid species that was erroneously deleted from the Finnish list was confirmed. Thus, the number of Finnish fungus gnats and gall midges now totals 772 and 359 species, respectively.

Materials and methods

All material reported here was collected from Finnish Lapland (Fig. 1). Lapland is an administrative area, covering a land area of ca. 100k km². The SW corner of the area, close to the Baltic Sea, is middle boreal. The central part of Lapland is north boreal: coniferous forests prevail in the landscape, but there are isolated tree-less fells. Northernmost Lapland is an oroarctic area, sometimes called subalpine ecoregion. Fells and mountain birch forests prevail; isolated pine forests occur in some river valleys. The length of the thermal growing season (i.e. the number of days with the average temperature greater than + 5 C degrees after snow melt) is ca. 140-150 days in the middle boreal and ca. 105-110 days in the subalpine ecoregion (<http://ilmatieteenlaitos.fi/terminen-kasvukausi>, website accessed 28.4.2015).

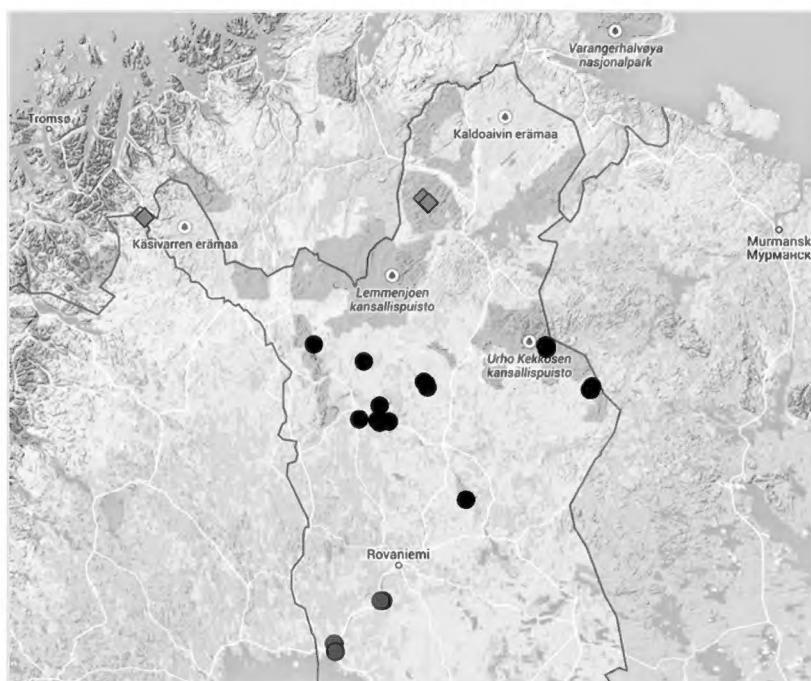


Figure 1.

A map of Finnish Lapland and the collecting localities of the Bibionomorpha species reported in the present paper. Green dots=middle boreal ecoregion, black dots=north boreal ecoregion, red diamonds=subalpine ecoregion. The map was created by using Google Maps.

All material is deposited in the private collection of Jukka Salmela, Rovaniemi (JES). All specimens are stored in 70 % ethanol, kept in 2 ml plastic vials with screw cap and a rubber o-ring seal. Hypopygia of some specimens are kept in separate 0,5 ml microvials in glycerol.

Layer photos were taken using an Olympus E520 digital camera, attached to an Olympus SZX16 stereomicroscope. Digital photos were captured using the programmes Deep Focus 3.1 and Quick PHOTO CAMERA 2.3. Extended depth of focus images were reconstructed in the program Combine ZP.

Taxon treatments

Eomastix incerta (Jaschhof, 2002)

Materials

- a. country: Finland; stateProvince: Lapponia kemensis pars orientalis; verbatimLocality: Savukoski, Urho Kekkonen National Park, Jaurujoki; verbatimLatitude: 68.1196; verbatimLongitude: 28.5888; verbatimCoordinateSystem: decimal degrees; verbatimSRS: WGS84; samplingProtocol: trunk window trap; eventDate: 2014-7-1/8-5; habitat: burned, pine dominated forest, trap was set on a standing spruce; individualCount: 1; sex: male; catalogNumber: DIPT-JS-2014-0247; recordedBy: J. Salmela; identifiedBy: J. Salmela; institutionCode: JES
- b. country: Finland; stateProvince: Lapponia kemensis pars orientalis; verbatimLocality: Savukoski, Urho Kekkonen National Park, Jaurujoki; verbatimLatitude: 68.1205; verbatimLongitude: 28.5815; verbatimCoordinateSystem: decimal degrees; verbatimSRS: WGS84; samplingProtocol: trunk window trap; eventDate: 2009-6-4/9-16; habitat: burned,

pine dominated forest, trap was set on a standing spruce; individualCount: 10; sex: 8 male, 2 female; catalogNumber: DIPT-JS-2014-0276; recordedBy: J. Salmela; otherCatalogNumbers: DIPT-JS-2014-0243, DIPT-JS-2014-0341, DIPT-JS-2014-0492, DIPT-JS-2014-0493; identifiedBy: J. Salmela; institutionCode: JES

Distribution

European. The species (Fig. 2) was described from Sweden, (Tyresta) as *Gongromastix incerta* (Jaschhof 2002), and was later transferred to a monotypic genus *Eomastix* (Jaschhof and Jaschhof 2009). The species is known from Norway and Sweden, from a single site in both countries (Jaschhof and Jaschhof 2009). The Finnish locality is in Urho Kekkonen National Park, in the north boreal zone, close to the Russian border.



Figure 2.

Eomastix incerta (Jaschhof) (Cecidomyiidae), male, DIPT-JS-2014-0492.

Ecology

Larvae of Lestremiinae are perhaps mostly saproxylic (Jaschhof and Jaschhof 2009). The species is most likely to be pyrophilous, requiring or preferring forest fire areas. In Sweden, the species was collected from site that had experienced forest fire roughly one year earlier (Jaschhof and Jaschhof 2009). The Finnish collecting site is an old-growth burnt forest, dominated by pine (*Pinus sylvestris*), with scattered spruce (*Picea abies*) and birch (*Betula* sp). The forest fire site (Fig. 3) is circa 34 ha in area, and the fire was ignited by lightning in late July 2013. The species seems to have rather long flying season, from June to August.



Figure 3.

Forest fire site in Savukoski, Finnish Lapland, Urho Kekkonen National Park. Forest fire took place in 2013 and insect sampling (trunk-window traps) was performed in 2014. Two rare and poorly known cecidomyiids, *Eomastix incerta* (Jaschhof) and *Lestremia solidaginis* (Felt), were caught. Both species are probably pyrophilous. Photo Jukka Salmela 6/2014.

***Lestremia solidaginis* (Felt, 1907)**

Materials

- a. country: Finland; stateProvince: Lapponia kemensis pars orientalis; verbatimLocality: Savukoski, Urho Kekkonen National Park, Jaurujoki; verbatimLatitude: 68.1174; verbatimLongitude: 28.5814; verbatimCoordinateSystem: decimal degrees; verbatimSRS: WGS84; samplingProtocol: trunk window trap; eventDate: 2014-8-5/9-16; habitat: burned, pine dominated forest, trap was set on a standing pine; individualCount: 1; sex: male; catalogNumber: DIPT-JS-2014-0343; recordedBy: J. Salmela; identifiedBy: J. Salmela; institutionCode: JES
- b. country: Finland; stateProvince: Lapponia kemensis pars orientalis; verbatimLocality: Savukoski, Urho Kekkonen National Park, Jaurujoki; verbatimLatitude: 68.1191; verbatimLongitude: 28.5844; verbatimCoordinateSystem: decimal degrees; verbatimSRS: WGS84; samplingProtocol: trunk window trap; eventDate: 2014-8-5/9-16; habitat: burned, pine dominated forest, trap was set on a standing spruce; individualCount: 1; sex: male; catalogNumber: DIPT-JS-2014-0350; recordedBy: J. Salmela; identifiedBy: J. Salmela; institutionCode: JES
- c. country: Finland; stateProvince: Lapponia kemensis pars orientalis; verbatimLocality: Savukoski, Urho Kekkonen National Park, Jaurujoki; verbatimLatitude: 68.1192; verbatimLongitude: 28.5780; verbatimCoordinateSystem: decimal degrees; verbatimSRS: WGS84; samplingProtocol: trunk window trap; eventDate: 2014-8-5/9-16; habitat: burned, pine dominated forest, trap was set on a standing pine; individualCount: 4; sex: male; catalogNumber: DIPT-JS-2014-0352; recordedBy: J. Salmela; identifiedBy: J. Salmela; institutionCode: JES

Distribution

Holarctic. The species is known to occur widely in the Nearctic region, but in the Palaearctic recorded only from southern Sweden (Jaschhof and Jaschhof 2009).

Ecology

Perhaps a pyrophilous species (Jaschhof and Jaschhof 2009), a hypothesis supported by our observation. Swedish locality was a forest-fire site in Tyresta (Jaschhof 2002, Jaschhof and Jaschhof 2009). Finnish locality, identical to *Eomastix incerta*, see above.

Porricondyla macrodon Jaschhof, 2013

Material

- a. country: Finland; stateProvince: Ostrobothnia borealis pars borealis; verbatimLocality: Keminmaa, Kallinkangas; verbatimLatitude: 65.8173; verbatimLongitude: 24.4995; verbatimCoordinateSystem: decimal degrees; verbatimSRS: WGS84; samplingProtocol: Malaise trap; eventDate: 2014-7-28/9-23; habitat: rich fen; individualCount: 1; sex: male; catalogNumber: DIPT-JS-2014-0470; recordedBy: J. Salmela; identifiedBy: J. Salmela; institutionCode: JES

Distribution

European. The species was described recently from southern Sweden, Uppsala and Tyresta (Jaschhof and Jaschhof 2013), no other records are available. The Finnish locality is in SW Lapland, middle boreal ecoregion.

Ecology

The holotype specimen was collected from an "open woodland with old oaks" (Jaschhof and Jaschhof 2013). The Finnish sampling site is a rich fen, surrounded by young deciduous forest. Larvae of Porricondylinae midges are terrestrial mycelium feeders, living on detritus and dead wood (Jaschhof and Jaschhof 2013).

Asindulum nigrum Latreille, 1805

Material

- a. country: Finland; stateProvince: Ostrobothnia borealis pars borealis; verbatimLocality: Tornio, Isonkummunjänkä Mire Conservation Area, Kusiaiskorpi; verbatimLatitude: 65.888; verbatimLongitude: 24.479; verbatimCoordinateSystem: decimal degrees; verbatimSRS: WGS84; samplingProtocol: Malaise trap; eventDate: 2013-8-1/9-26; habitat: calcareous rich fen, rusty deposit; individualCount: 1; sex: male; catalogNumber: DIPT-JS-2014-0115; recordedBy: J. Salmela; identifiedBy: J. Salmela; institutionCode: JES

Distribution

European. The species (Fig. 4) was described from France (Latreille 1805) and has been later recorded from Great Britain, Central and North Europe (Matile 1975, Chandler 1991, Chandler 2004). The species seems to be rather rare throughout its range (Hedmark 2004, Chandler 1991, Ševčík and Kurina 2011b). In Sweden the species is very rare, known from the southern and central parts of the country, but it has probably vanished from four out of six of its previously occupied biogeographical provinces (Cederberg et al. 2010).



Figure 4.

Asindulum nigrum Latreille (Keroplastidae), male, DIPT-JS-2014-0487. Adult flies of both sexes visit flowers and have elongated mouthparts.

Ecology

Immature stages are unknown, but Orfeliini larvae are predaceous (Marshall 2012). *Asindulum nigrum* has been collected from calcareous wetlands (Chandler 1991, Hedmark 2004) and adult flies have often been observed visiting flowers, such as Apiaceae and *Saxifraga hirculus* (Bechev 2010). Finnish collecting site is a calcareous rich fen with iron-rich seepages (for a detailed description of the habitat, see Salmela et al. 2014).

Conservation

The species is red-listed in Great Britain (NT, Falk and Chandler 2005) and Sweden (VU, Cederberg et al. 2010).

Macrocera nigropicea* Lundström, 1906*Materials**

- a. country: Finland; stateProvince: Lapponia kemensis pars occidentalis; verbatimLocality: Kittilä, Taljavaaranvuoma; verbatimLatitude: 67.577; verbatimLongitude: 25.362; verbatimCoordinateSystem: decimal degrees; verbatimSRS: WGS84; samplingProtocol: Malaise trap; eventDate: 2007-6-25/7-24; habitat: rich fen; individualCount: 6; sex: 4 male, 2 female; catalogNumber: MYCE-NV-2013-0035; recordedBy: J. Salmela; identifiedBy: J. Salmela; institutionCode: JES
- b. country: Finland; stateProvince: Lapponia kemensis pars occidentalis; verbatimLocality: Kittilä, Repsuvuoma; verbatimLatitude: 67.605; verbatimLongitude: 24.964; verbatimCoordinateSystem: decimal degrees; verbatimSRS: WGS84; samplingProtocol: Malaise trap; eventDate: 2007-6-26/7-25; habitat: rich fen; individualCount: 2; sex: male; catalogNumber: MYCE-NV-2013-0054; recordedBy: J. Salmela; identifiedBy: J. Salmela; institutionCode: JES
- c. country: Finland; stateProvince: Lapponia kemensis pars occidentalis; verbatimLocality: Kittilä, Silmäsvuoma; verbatimLatitude: 67.583; verbatimLongitude: 25.543; verbatimCoordinateSystem: decimal degrees; verbatimSRS: WGS84; samplingProtocol: Malaise trap; eventDate: 2007-6-25/7-25; habitat: rich fen; individualCount: 2; sex: male; catalogNumber: MYCE-NV-2013-0057; recordedBy: J. Salmela; identifiedBy: J. Salmela; institutionCode: JES
- d. country: Finland; stateProvince: Lapponia kemensis pars occidentalis; verbatimLocality: Kittilä, Nunaravuoma; verbatimLatitude: 67.699; verbatimLongitude: 25.353; verbatimCoordinateSystem: decimal degrees; verbatimSRS: WGS84; samplingProtocol: Malaise trap; eventDate: 2007-6-1/6-27; habitat: poor sedge fen; individualCount: 1; sex: male; catalogNumber: MYCE-NV-2013-0074; recordedBy: J. Salmela; identifiedBy: J. Salmela; institutionCode: JES
- e. country: Finland; stateProvince: Lapponia kemensis pars occidentalis; verbatimLocality: Kittilä, Kielisenpalo; verbatimLatitude: 68.021; verbatimLongitude: 25.053; verbatimCoordinateSystem: decimal degrees; verbatimSRS: WGS84; samplingProtocol: Malaise trap; eventDate: 2007-6-26/7-27; habitat: rich spring fen; individualCount: 1; sex: male; catalogNumber: MYCE-NV-2013-0099; recordedBy: J. Salmela; identifiedBy: J. Salmela; institutionCode: JES
- f. country: Finland; stateProvince: Lapponia kemensis pars occidentalis; verbatimLocality: Kittilä, Akharamanvuoma; verbatimLatitude: 67.593; verbatimLongitude: 25.308; verbatimCoordinateSystem: decimal degrees; verbatimSRS: WGS84; samplingProtocol: Malaise trap; eventDate: 2007-6-25/8-2; habitat: rich pine fen; individualCount: 5; sex: 3 female, 2 male; catalogNumber: DIPT-JS-2014-0332; recordedBy: J. Salmela; identifiedBy: J. Salmela; institutionCode: JES
- g. country: Finland; stateProvince: Lapponia kemensis pars orientalis; verbatimLocality: Savukoski, Törmäoja, Ahot; verbatimLatitude: 67.817; verbatimLongitude: 29.432; verbatimCoordinateSystem: decimal degrees; verbatimSRS: WGS84; samplingProtocol: Malaise trap; eventDate: 2014-7-8/8-7; habitat: dry meadow; individualCount: 2; sex: male; catalogNumber: DIPT-JS-2014-0414; recordedBy: J. Salmela; identifiedBy: J. Salmela; institutionCode: JES
- h. country: Finland; stateProvince: Lapponia kemensis pars orientalis; verbatimLocality: Savukoski, Törmäoja, Ahot; verbatimLatitude: 67.821; verbatimLongitude: 29.436; verbatimCoordinateSystem: decimal degrees; verbatimSRS: WGS84; samplingProtocol: Malaise trap; eventDate: 2014-7-8/8-7; habitat: margin of pond, surrounded by dry

meadow; individualCount: 1; sex: male; catalogNumber: DIPT-JS-2014-0474;
 recordedBy: J. Salmela; identifiedBy: J. Salmela; institutionCode: JES

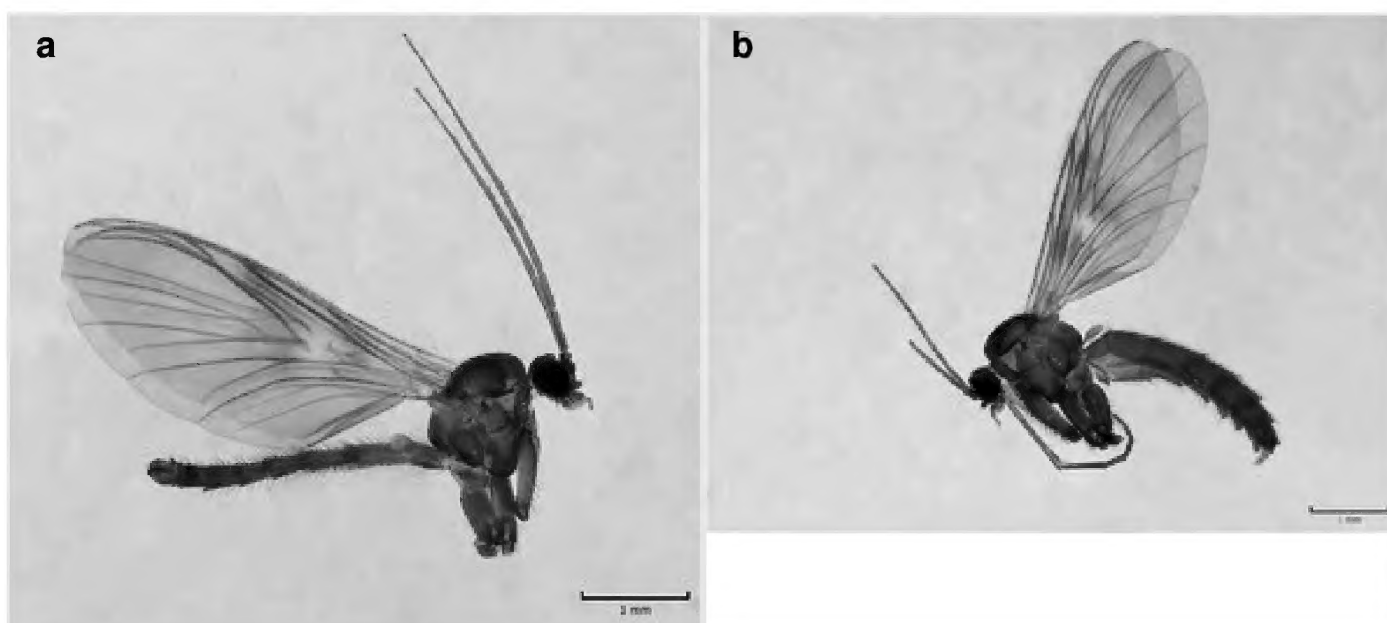


Figure 5.

Macrocera nigropicea Lundström (Keroplatidae), habitus, DIPT-JS-2014-0332.

a: Male.

b: Female.

Distribution

European. The species (Fig. 5) was described from Russia, Kola peninsula (Lundström 1906). Chandler (Chandler 1990) redescribed the species and reported it from the British Isles. Later Kjaerandsen et al. (Kjaerandsen et al. 2007a) verified the species from Iceland and discussed the distribution and taxonomy of the species. Although Kjaerandsen et al. had studied material collected from South Finland (Ab, Karislojo [Karjalohja]; Ka, Vehkalahti; N, Esbo [Espoo], Westend, six males in total), Jakovlev (Jakovlev 2014) deleted the species from the Finnish list, assuming that the species had not been found within post WWII borders of Finland. Here we confirm the occurrence of the species in Finland, and report eight new sites from Finnish Lapland. In Fennoscandia, *M. nigropicea* is only known from Murmansk oblast and Finland.

Ecology

Immature stages are unknown, but *Macrocera* larvae are predaceous and mostly associated with soil and dead wood (see e.g. Falk and Chandler 2005, Ševčík and Roháček 2008). *Macrocera nigropicea* is perhaps associated with peatlands (Chandler 1990) or woodlands (Kjaerandsen et al. 2007a). Six out of eight sites reported here are aapamires, that is, minerogenous fens with wet flarks and dry bog-level strings. Two of the sites are open, dry meadows, but not situated far from either forest or peaty pond margins. Based on our observations, *M. nigropicea* is perhaps not an obligate mire-dwelling species, but may prefer open habitats.

Sciophila arizonensis Zaitzev, 1982

Material

- a. country: Finland; stateProvince: Ostrobothnia borealis pars borealis; verbatimLocality: Kemijärvi, Pyhä-Luosto National Park, Huttuoja; verbatimLatitude: 66.9983; verbatimLongitude: 27.0265; verbatimCoordinateSystem: decimal degrees; verbatimSRS: WGS84; samplingProtocol: Malaise trap; eventDate: 2014-8-8/9-19; habitat: rusty spring brook, pine mire, close to riparian forest; individualCount: 1; sex: male; catalogNumber: DIPT-JS-2014-0385; recordedBy: J. Salmela; identifiedBy: J. Salmela; institutionCode: JES

Distribution

Holarctic. The description of the species (Fig. 6) was based on material collected from three Nearctic sites in Arizona, British Columbia and Ontario (Zaitzev 1982). Later the species has been recorded from the Russian Far East (Zaitzev 2006), France, Switzerland (Chandler 2004) and the Czech Republic (Ševčík 2005). New for the Fennoscandian fauna.



Figure 6.

Sciophila arizonensis Zaitzev (Mycetophilidae), male hopygium, dorsal view, DIPT-JS-2014-0385.

Ecology

Immature stages are unknown, but *Sciophila* larvae are fungivorous, living on the surfaces of agaric and polyporous fungi (Ševčík 2010), rarely on Pezizales (Jakovlev 2011). Finnish locality (Fig. 7) is a iron-rich spring-fed brook on an ecotone between a pine mire and a luxuriant riparian forest.



Figure 7.

Malaise trap in Kemijärvi, Finnish Lapland, Pyhä-Luosto National Park, close to Huttuoja. The sampling site is a mixture of habitats, such as rusty spring brook, riparian forest and pine mire. Rare Holarctic fungus-gnat *Sciophila arizonensis* Zaitzev was identified from the trap material. J. Salmela 6/2014.

Sciophila fridolini Stackelberg, 1943

Material

- a. country: Finland; stateProvince: Lapponia inariensis; verbatimLocality: Inari, Muotkatunturi Wilderness Area, Ceavrajohoaivi; verbatimLatitude: 69.1750; verbatimLongitude: 26.2012; verbatimCoordinateSystem: decimal degrees; verbatimSRS: WGS84; samplingProtocol: Malaise trap; eventDate: 2014-6-26/8-5; habitat: alpine headwater stream; individualCount: 1; sex: male; catalogNumber: DIPT-JS-2015-0200; recordedBy: E. Rundgren; identifiedBy: J. Salmela; institutionCode: JES

Distribution

Holarctic. The species was described from Russia, Kola Peninsula (Stackelberg 1943), and has since been recorded from the British Isles (Hutson 1979), Norway (Gammelmo and Søli 2006), USA (Zaitzev 1982) and Czech Republic (Ševčík 2005). Record from East Palaearctic (Chandler 2004) refers to Kola Peninsula, so it is not an additional area of distribution (P.J. Chandler, pers.comm.).

Ecology

Immature stages are unknown, but *S. fridolini* is presumably a woodland species (Falk and Chandler 2005). The Finnish collecting site is an alpine wetland along a headwater stream, characterized by *Carex* tussocks, *Viola biflora* and sparse mountain birch forest.

Sciophila spinifera Zaitzev, 1982

Materials

- a. country: Finland; stateProvince: Lapponia kemensis pars orientalis; verbatimLocality: Sodankylä, Pomokaira, Paistipuolet NE; verbatimLatitude: 67.834; verbatimLongitude: 26.270; verbatimCoordinateSystem: decimal degrees; verbatimSRS: WGS84; samplingProtocol: Malaise trap; eventDate: 2009-6-1/6-29; habitat: intermediate rich spring fen; individualCount: 1; sex: male; catalogNumber: MYCE-NV-2013-0196; recordedBy: J. Salmela; identifiedBy: J. Salmela; institutionCode: JES
- b. country: Finland; stateProvince: Lapponia kemensis pars orientalis; verbatimLocality: Sodankylä, Pomokaira, Poksaselkä E; verbatimLatitude: 67.858; verbatimLongitude: 26.259; verbatimCoordinateSystem: decimal degrees; verbatimSRS: WGS84; samplingProtocol: Malaise trap; eventDate: 2009-6-1/6-29; habitat: spring brook surrounded by old-growth spruce forest; individualCount: 1; sex: male; catalogNumber: DIPT-JS-2014-0317; recordedBy: J. Salmela; identifiedBy: J. Salmela; institutionCode: JES
- c. country: Finland; stateProvince: Lapponia inariensis; verbatimLocality: Inari, Muotkatunturi Wilderness Area, Kielajoki; verbatimLatitude: 69.1464; verbatimLongitude: 26.2929; verbatimCoordinateSystem: decimal degrees; verbatimSRS: WGS84; samplingProtocol: Malaise trap; eventDate: 2014-6-26/8-5; habitat: herb-rich swampy birch forest; individualCount: 1; sex: male; catalogNumber: DIPT-JS-2015-0238; recordedBy: E. Rundgren; identifiedBy: J. Salmela; institutionCode: JES



Figure 8.

Sciophila spinifera Zaitzev (Mycetophilidae), male, DIPT-JS-2014-0317.

Distribution

European. In his original description, Zaitzev (Zaitzev 1982) assigned *S. spinifera* (Fig. 8) as a Finnish species, the holotype specimen was collected by Richard Frey from a place named "Opariornia". There is, however, no such place in Finland, and later the holotype was interpreted as a Swedish specimen, collected from Övertorneå (Kjaerandsen et al. 2007b, misspelled by Zaitzev), on the Swedish side of the River

Tornio between Finland and Sweden. In addition to Sweden, the species is known from southern Norway (Økland and Zaitzev 1997) and Switzerland (Chandler 1998).

Ecology

Immature stages are unknown, but *S. spinifera* is presumably a forest-dwelling species (Økland and Zaitzev 1997). Finnish sampling sites are either old-growth, spruce-dominated moist forests (two sites) or a swampy birch forest.

Allodia (Brachycampta) bohémica Ševčík, 2004

Material

- a. country: Finland; stateProvince: Ostrobothnia borealis pars borealis; verbatimLocality: Rovaniemi, Savioja; verbatimLatitude: 66.227; verbatimLongitude: 25.376; verbatimCoordinateSystem: decimal degrees; verbatimSRS: WGS84; samplingProtocol: Malaise trap; eventDate: 2013-8-1/9-26; habitat: herb-rich forest along a headwater stream; individualCount: 1; sex: male; catalogNumber: DIPT-JS-2014-0178; recordedBy: J. Salmela; identifiedBy: J. Salmela; institutionCode: JES

Distribution

European. A rarely collected and poorly known species, reported from Czech Republic (Ševčík 2004) and Russian Karelia (Jakovlev et al. 2014). The Finnish collecting site reported here is located in SW Lapland, middle boreal ecoregion.

Ecology

Larvae of *Allodia* are likely to be fungivorous, see discussion in Jakovlev et al. 2014. The Finnish locality is a herb-rich riparian forest, dominated by deciduous trees.

Brevicornu setigerum Zaitzev, 1995

Materials

- a. country: Finland; stateProvince: Lapponia inariensis; verbatimLocality: Inari, Muotkatunturi Wilderness Area, Kielajoki; verbatimLatitude: 69.1464; verbatimLongitude: 26.2929; verbatimCoordinateSystem: decimal degrees; verbatimSRS: WGS84; samplingProtocol: Malaise trap; eventDate: 2014-6-26/8-5; habitat: herb-rich swampy birch forest; individualCount: 1; sex: male; catalogNumber: DIPT-JS-2015-0213; recordedBy: E. Rundgren; identifiedBy: J. Salmela; institutionCode: JES
- b. country: Finland; stateProvince: Lapponia kemensis pars orientalis; verbatimLocality: Savukoski, Törmäoja, Ahot; verbatimLatitude: 67.8273; verbatimLongitude: 29.4369; verbatimCoordinateSystem: decimal degrees; verbatimSRS: WGS84; samplingProtocol: Malaise trap; eventDate: 2013-8-7/9-19; habitat: seasonally wet meadow with large *Carex-tussocs*, surrounded by dry meadow; individualCount: 1; sex: male; catalogNumber: MYCE-JS-2013-0356; recordedBy: J. Salmela; identifiedBy: J. Salmela; institutionCode: JES

- c. country: Finland; stateProvince: Lapponia kemensis pars orientalis; verbatimLocality: Savukoski, Törmäoja, Ahot; verbatimLatitude: 67.8176; verbatimLongitude: 29.4372; verbatimCoordinateSystem: decimal degrees; verbatimSRS: WGS84; samplingProtocol: Malaise trap; eventDate: 2014-8-8/9-19; habitat: dry meadow; individualCount: 1; sex: male; catalogNumber: DIPT-JS-2014-0436; recordedBy: J. Salmela; identifiedBy: J. Salmela; institutionCode: JES

Distribution

European. A poorly known and rarely collected Fennoscandian species (Fig. 9). The species was described by Zaitzev (in Zaitzev and Polevoi 1995), based on a holotype male collected from Kivach Nature Reserve, Russian Karelia. Recently, the species was observed from Alta in northern Norway (Søli and Rindal 2012).

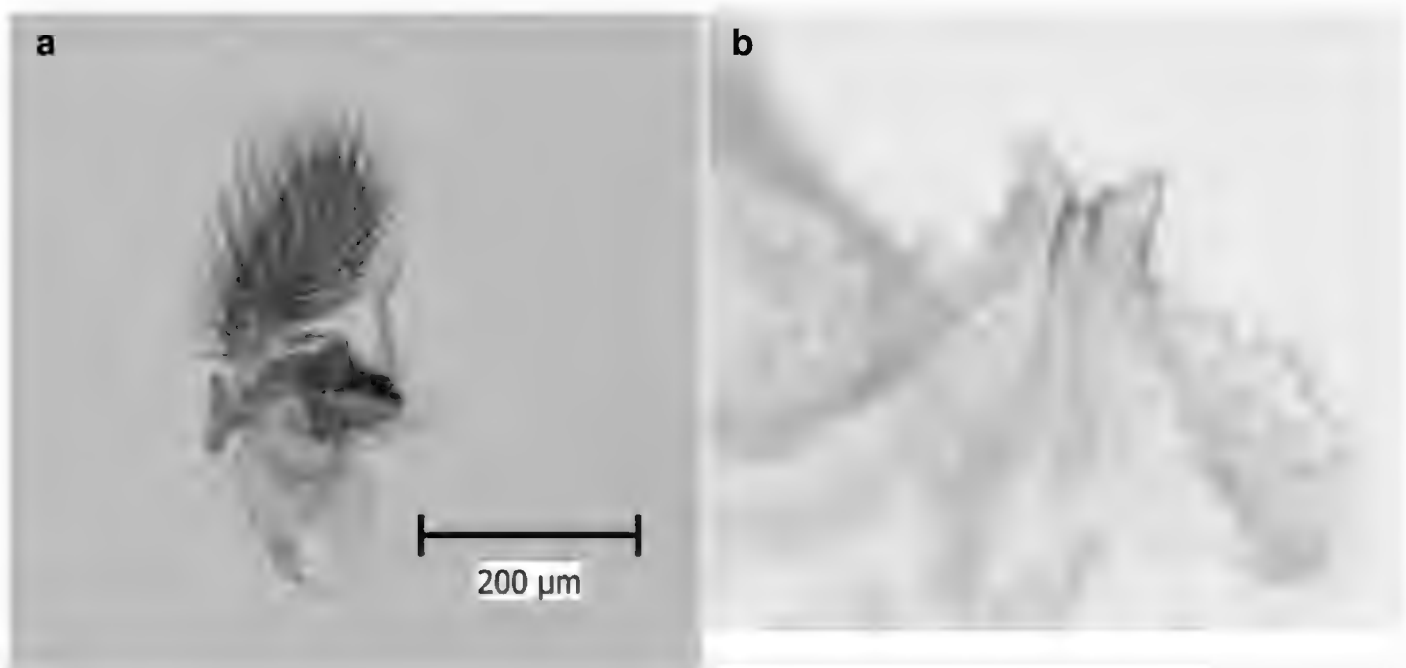


Figure 9.

Brevicornu setigerum Zaitzev (Mycetophilidae), details of male hypopygium, MYCE-JS-2013-0356.

a: Gonostylus, lateral view.

b: Ventral appendage of gonocoxites, ventral view; this structure has not been figured before.

Ecology

Immature stages are unknown, but *Brevicornu* larvae are most likely associated with microfungi in dead wood and soil litter (Jakovlev 2011). The species is presumably a forest-dwelling fungus gnat; at least, the Norwegian sampling site was a mixed forest (Ekrem et al. 2012). The Finnish locality is a swampy birch forest in the subalpine ecoregion.

Stigmatomeria obscura* (Winnertz, 1864)*Material**

- a. country: Finland; stateProvince: Lapponia enontekiensis; verbatimLocality: Enontekiö, Kilpisjärvi, Saana; verbatimLatitude: 69.0480; verbatimLongitude: 20.8072; verbatimCoordinateSystem: decimal degrees; verbatimSRS: WGS84; samplingProtocol: sweep net; eventDate: 2014-7-1; habitat: road side, mountain birch forest; individualCount: 1; sex: male; catalogNumber: DIPT-JS-2015-0183; recordedBy: J. Kahanpää; identifiedBy: J. Salmela; institutionCode: JES

Distribution

European, but likely to have wide Palaearctic range (Kjaerandsen et al. 2007b). The species was described from Germany (Winnertz 1864), but was later tentatively considered as a junior synonym of *S. crassicornis* (Stannius) by Tuomikoski (Tuomikoski 1966). However, status of *S. obscura* as a valid species was recently reinstated (), and the species is known to occur in Germany, Sweden (Skåne) (Kjaerandsen et al. 2007b) and Norway (Kongsvoll) (Søli and Kjaerandsen 2008). The Finnish locality is in NW Lapland, Kilpisjärvi, belonging to the Caledonian mountain range.

Ecology

Immature stages are unknown. The Finnish locality was a road-side in a mountain birch forest, close to Saana fell.

Mycetophila haruspica* Plassmann, 1990*Materials**

- a. country: Finland; stateProvince: Lapponia kemensis pars orientalis; verbatimLocality: Savukoski, Joutenoja; verbatimLatitude: 67.8213; verbatimLongitude: 29.4408; verbatimCoordinateSystem: decimal degrees; verbatimSRS: WGS84; samplingProtocol: Malaise trap; eventDate: 2012-8-16/9-18; habitat: headwater stream, boreal forest; individualCount: 1; sex: male; catalogNumber: MYCE-JS-2013-0065; recordedBy: J. Salmela; identifiedBy: J. Salmela; institutionCode: JES
- b. country: Finland; stateProvince: Lapponia enontekiensis; verbatimLocality: Enontekiö, Pallas-Yllästunturi National Park, Röyninkuru; verbatimLatitude: 68.1482; verbatimLongitude: 24.0750; verbatimCoordinateSystem: decimal degrees; verbatimSRS: WGS84; samplingProtocol: Malaise trap; eventDate: 2013-8-7/9-19; habitat: headwater stream, old-growth spruce forest; individualCount: 1; sex: male; catalogNumber: DIPT-JS-2014-0146; recordedBy: J. Salmela; identifiedBy: J. Salmela; institutionCode: JES
- c. country: Finland; stateProvince: Lapponia kemensis pars orientalis; verbatimLocality: Sodankylä, Pomokaira-Tenniöaapa Mire Conservation Area, Syväkuru; verbatimLatitude: 67.8731; verbatimLongitude: 26.2148; verbatimCoordinateSystem: decimal degrees; verbatimSRS: WGS84; samplingProtocol: Malaise trap; eventDate: 2013-8-14/9-19; habitat: willow swamp with seepages, old-growth boreal forest; individualCount: 1; sex:

- male; catalogNumber: DIPT-JS-2014-0202; recordedBy: J. Salmela; identifiedBy: J. Salmela; institutionCode: JES
- d. country: Finland; stateProvince: Lapponia kemensis pars orientalis; verbatimLocality: Savukoski, Urho Kekkonen National Park, Tyyroja; verbatimLatitude: 68.1384; verbatimLongitude: 28.5723; verbatimCoordinateSystem: decimal degrees; verbatimSRS: WGS84; samplingProtocol: Malaise trap; eventDate: 2014-6-4/7-1; habitat: spring brook, old-growth spruce forest; individualCount: 1; sex: male; catalogNumber: DIPT-JS-2014-0228; recordedBy: J. Salmela; identifiedBy: J. Salmela; institutionCode: JES
- e. country: Finland; stateProvince: Lapponia kemensis pars orientalis; verbatimLocality: Savukoski, Urho Kekkonen National Park, Tyyroja; verbatimLatitude: 68.1384; verbatimLongitude: 28.5723; verbatimCoordinateSystem: decimal degrees; verbatimSRS: WGS84; samplingProtocol: Malaise trap; eventDate: 2014-8-5/9-16; habitat: spring brook, old-growth spruce forest; individualCount: 1; sex: male; catalogNumber: DIPT-JS-2014-0384; recordedBy: J. Salmela; identifiedBy: J. Salmela; institutionCode: JES
- f. country: Finland; stateProvince: Lapponia kemensis pars orientalis; verbatimLocality: Savukoski, Hannu Ollin vaara; verbatimLatitude: 67.8444; verbatimLongitude: 29.4689; verbatimCoordinateSystem: decimal degrees; verbatimSRS: WGS84; samplingProtocol: Malaise trap; eventDate: 2013-8-7/9-19; habitat: spring brook, old-growth boreal forest; individualCount: 1; sex: male; catalogNumber: MYCE-JS-2013-0361; recordedBy: J. Salmela; identifiedBy: J. Salmela; institutionCode: JES

Distribution

European, so far reported only from Fennoscandia. The species (Fig. 10) was described from North Sweden (Abisko) (Plassmann 1990), and later findings are also from the northern part of the country (Kjaerandsen et al. 2007b). Only once recorded from North Norway, Alta (Søli and Rindal 2012). Here reported from six sites in north boreal Finland.



Figure 10.

Mycetophila haruspica Plassmann (Mycetophilidae), male, DIPT-JS-2014-0202.

Ecology

The species has been collected from both subalpine and boreal ecoregions, but detailed habitat descriptions are lacking in the literature. Finnish sampling sites are small lotic water bodies surrounded by old-growth boreal forests.

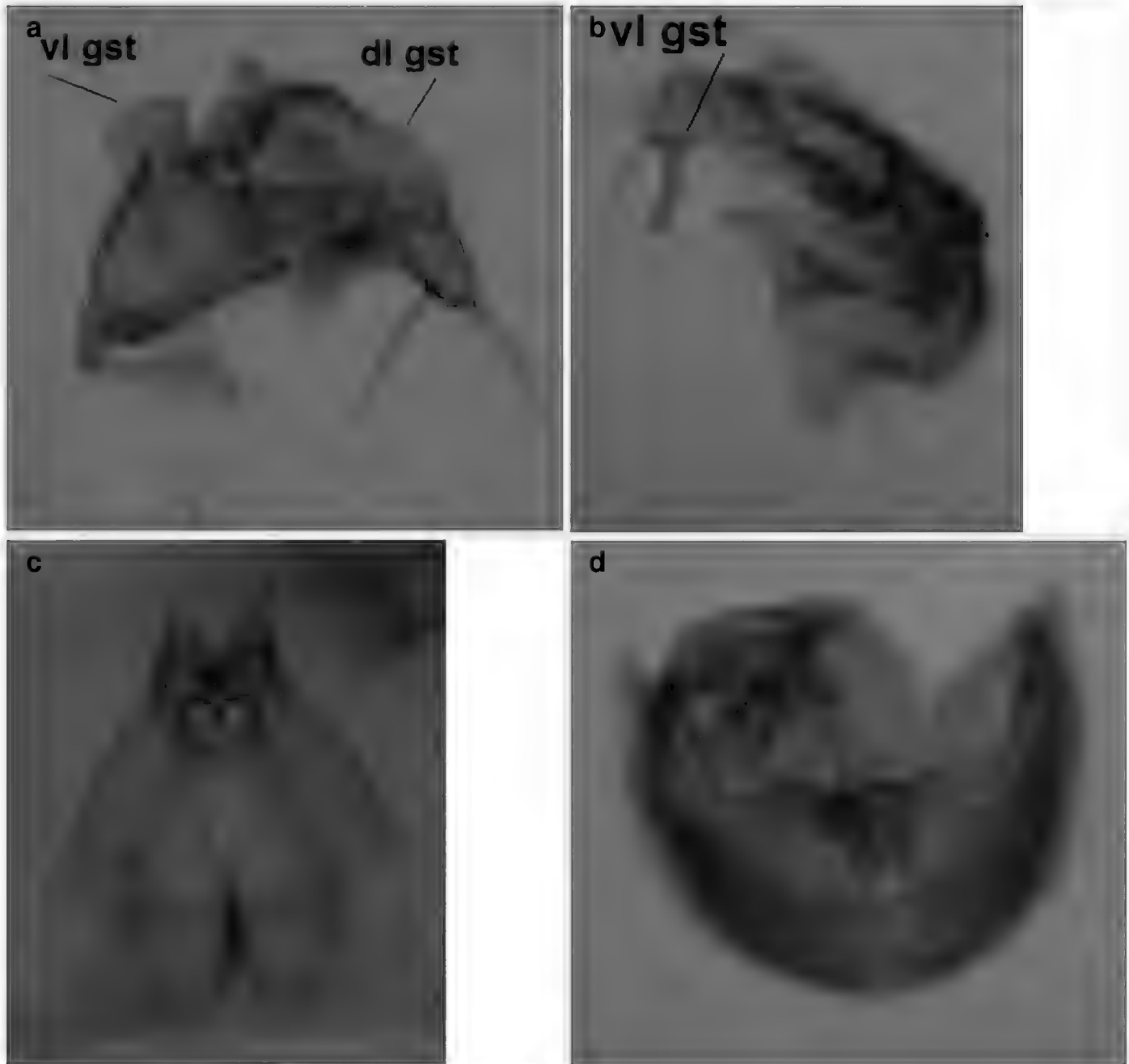


Figure 11.

Mycetophila haruspica Plassmann (Mycetophilidae), DIPT-JS-2014-0146, details of male hypopygium.

a: Gonostylus, lateral (inner) view. vl gst=ventral lobe of gonostylus, dl gst=dorsal lobe of gonostylus.

b: Gonostylus, ventral view.

c: Aedeagus, dorsal view.

d: Ventral margin of gonocoxites.

Taxon discussion

The original description of *M. haruspica* is rather uninformative, barely sufficient for identification purposes (Plassmann 1990, fig. 8). Proper redescription of this species is

beyond the scope of this manuscript, but the morphology of the male hypopygium is reviewed here. The ventral lobe of gonostylus (vl gst, Fig. 11) has a conspicuous, helmet-like rounded lobe on dorsal margin and a small, hyaline spine next to it. Another prominent feature of vl gst is a long ventro-caudal spine, slightly bent beyond its mid-point (Fig. 11). Dorsal lobe of gonostylus (dl gst, Fig. 11) has a narrow, rounded lobe on the dorsal margin. The general shape of aedeagus is cordate, caudally tapering, apex incised and apical corners with a pair of narrow, hyaline lobes (Fig. 11c). 9th tergite is about as long as gonocoxite. Ventral margin of gonocoxites is undulating (Fig. 11d). Based on the male hypopygium, the species is easy to separate from the other members of the vast genus *Mycetophila*.

***Mycetophila gemerensis* Ševčík & Kurina, 2011**

Material

- a. country: Finland; stateProvince: Ostrobothnia borealis pars borealis; verbatimLocality: Rovaniemi, Savioja; verbatimLatitude: 66.2251; verbatimLongitude: 25.3668; verbatimCoordinateSystem: decimal degrees; verbatimSRS: WGS84; samplingProtocol: Malaise trap; eventDate: 2013-5-24/6-28; habitat: headwater stream, deciduous herb-rich forest; individualCount: 1; sex: male; catalogNumber: DIPT-JS-2014-0189; recordedBy: J. Salmela; identifiedBy: J. Salmela; institutionCode: JES

Distribution

European. The species (Fig. 12a, c) was recently described from the Gemer region in the central part of Slovakia (Ševčík and Kurina 2011a). No other records are available. New for the Fennoscandian fauna.

Ecology

The holotype male was collected from a "spring area in a young spruce forest, 1230 m (above sea level)" Ševčík and Kurina 2011b). Finnish locality is a herb-rich riparian forest, dominated by deciduous trees.

Taxon discussion

The species is quite close to *M. lastovkai* Caspers, 1984 (Fig. 12b, d), a species that has been in the Nordic region reported from Sweden, Norway and Denmark (Kjaerandsen 2015). Nordic material of *M. lastovkai* should be re-examined in order to check the potential confusion with *M. gemerensis*.

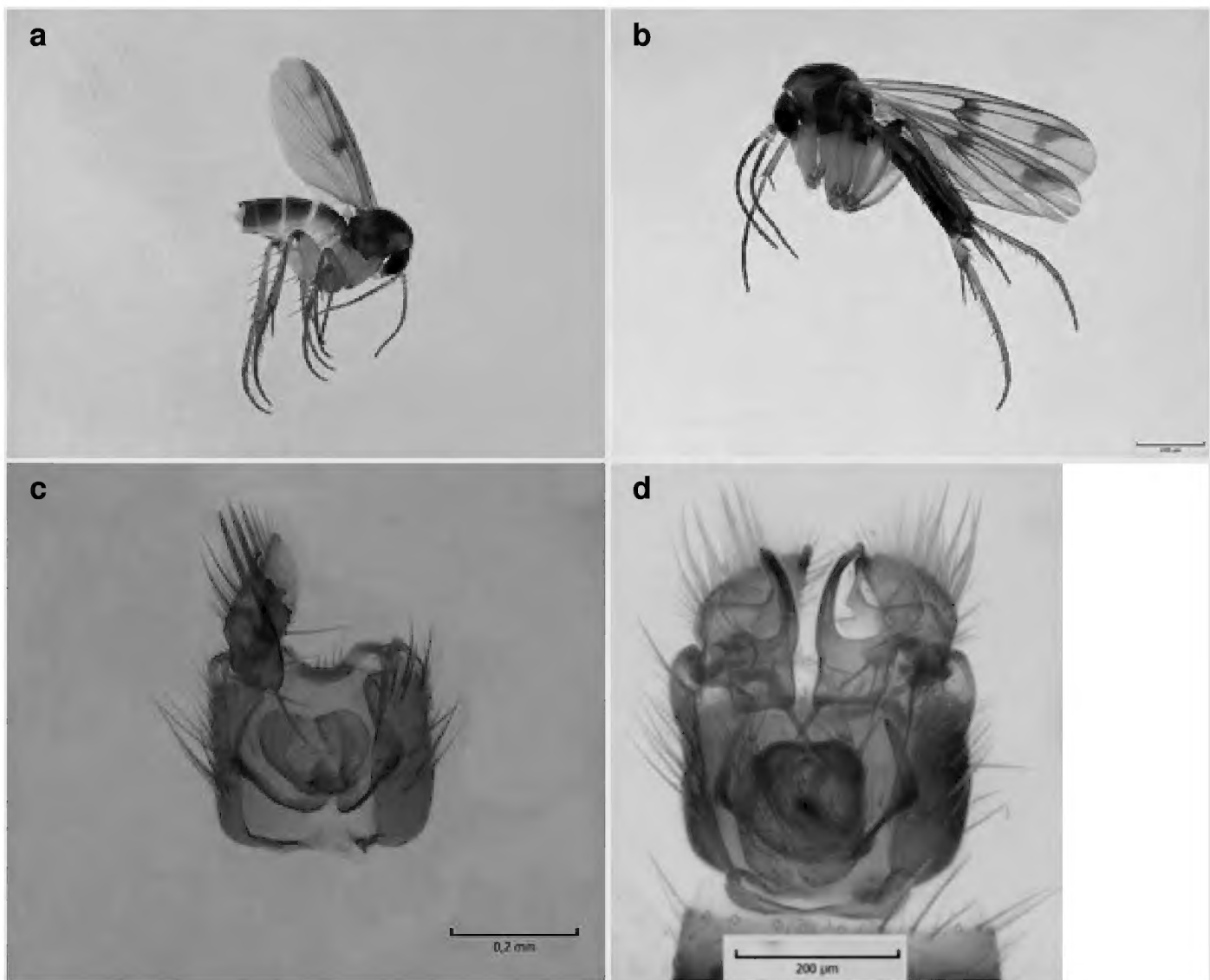


Figure 12.

Mycetophila gemerensis Ševčík & Kurina and *M. lastovkai* Caspers (Mycetophilidae), males.

a: *M. gemerensis*, habitus, DIPT-JS-2014-0189.

b: *M. lastovkai*, DIPT-JS-2014-0452, Romania, Vulcan Mt., 1420 m.a.s.l., 26.5.2014 Levente-Peter Kolcsar leg.

c: *M. gemerensis*, hypopygium, dorsal view, DIPT-JS-2014-0189.

d: *M. lastovkai*, hypopygium, dorsal view, DIPT-JS-2014-0452.

Acknowledgements

We thank Eerikki Rundgren and Jere Kahanpää for material, and Arto Saikkonen for his help in the Muotkatunturi area. Petri Martikainen and Petri Piisilä are acknowledged with gratitude for their help and expertise in the sampling of insects from Urho Kekkonen National Park. Thanks to Jostein Kjaerandsen who helped the first author in the identification of *Mycetophila haruspica*, and to Mitri Jauru who gave critical comments on the manuscript. English text was checked by John Kramer.

Author contributions

JS wrote the manuscript, JS and KMK took the layer photos.

References

- Bechev D (2010) Flower visitation of fungus gnats from the genera *Antlemon*, *Asindulum* and *Macrorrhyncha* (Diptera: Keroplatidae): published data and a new record. *ZooNotes* 7: 1-3.
- Cederberg B, Bartsch H, Bjelke U, Brodin Y, Engelmark R, Kjaerandsen J, Struwe I, Sörensson M, Viklund B (2010) Tvåvingar - Flies Diptera . In: Gärdenfors U (Ed.) Rödlistade arter i Sverige 2010 - The 2010 Red List of Swedish Species. SLU, Uppsala.
- Chandler PJ (1990) Notes on *Macrocera* Meigen (Mycetophiloidea, Keroplatidae) including *M. nigropicea* new to Britain. *Dipterists Digest* 3: 27-31.
- Chandler PJ (1991) New records of *Asindulum nigrum* Latreille (Diptera: Keroplatidae). *British Journal of Entomology and Natural History* 4: 76. URL: http://www.online-keys.net/sciaroidea/1991_2000/Chandler_1991_Asindulum_nigrum_in_England.pdf
- Chandler PJ (1998) Mycetophilidae. In: Merz B, Bächli G, Haenni J-, Gonseth Y (Eds) *Diptera - Checklist*. Fauna Helvetica 1. Centre suisse de cartographie de la faune, Neuchâtel, 369 pp.
- Chandler PJ (2004) Mycetophilidae. *Fauna Europaea* 1.0: 1. URL: <http://www.faunaeur.org>
- Ekrem T, Roth S, Andersen T, Stur E, Søli G, Halvorsen GA (2012) Insects inhabiting freshwater and humid habitats in Finnmark, northern Norway. *Norwegian Journal of Entomology* 59: 91-107. URL: <http://www.entomologi.no/journals/nje/2012-2/pdf/nje-vol59-no2-91-107-ekrem.pdf>
- Falk S, Chandler P (2005) A review of the scarce and threatened flies of Great Britain. Part 2: Nematocera and Aschiza not dealt with by Falk (1991). *Species status* 2: 1-189.
- Gammelmo Ø, Søli G (2006) Norwegian fungus gnats of the family Mycetophilidae (Diptera, Nematocera). *Norwegian Journal of Entomology* 53: 57-69.
- Hackman W (1980) A checklist of Finnish Diptera . *Notulae Entomologicae* 60: 17-48.
- Hedmark K (2004) *Asindulum nigrum*. *Artfaktablad*, Artdatabanken, SLU, Uppsala, Sweden 2010-02-15: 2004. URL: http://www.artfakta.se/artfaktablad/Asindulum_Nigrum_232165.pdf
- Hutson MA (1979) Notes on Sciophilinae (Dipt., Mycetophilidae) with a revision of Palaearctic *Syntemna* Winnertz. *Entomologist's Monthly Magazine* 114: 131-145.
- Jakovlev J (2011) Fungus gnats (Diptera: Sciarioidea) associated with dead wood and wood growing fungi: new rearing data from Finland and Russian Karelia and general analysis of known larval microhabitats in Europe. *Entomologica Fennica* 22: 157-189.
- Jakovlev J (2014) Checklist of the fungus gnats of Finland: Bolitophilidae, Diadocidiidae, Ditomyiidae, Keroplatidae and Mycetophilidae (Diptera). *ZooKeys* 441: 119-149. DOI: [10.3897/zookeys.441.7646](https://doi.org/10.3897/zookeys.441.7646)
- Jakovlev J, Salmela J, Polevoi A, Penttinen J, Vartiija N (2014) Recent noteworthy findings of fungus gnats from Finland and northwestern Russia (Diptera: Ditomyiidae, Keroplatidae, Bolitophilidae and Mycetophilidae). *Biodiversity Data Journal* 2: e1068: 1-139. DOI: [10.3897/BDJ.2.e1068](https://doi.org/10.3897/BDJ.2.e1068)
- Jaschhof M (2002) On rare and new gall midges of the tribes Lestremiini and Catochini from central Sweden (Cecidomyiidae, Lestremiinae). *Studia dipterologica* 8 (2001) (2): 427-440.

- Jaschhof M, Jaschhof C (2009) The Wood Midges (Diptera: Cecidomyiidae: Lestremiinae) of Fennoscandia and Denmark. *Studia dipterologica Supplement* 18: 1-333.
- Jaschhof M, Jaschhof C (2013) The Porricondylinae (Diptera: Cecidomyiidae) of Sweden with notes on extralimital species. *Studia dipterologica supplement* 20: 1-392.
- Jaschhof M, Skuhravá M, Penttinen J (2014) Checklist of the Cecidomyiidae (Diptera) of Finland. *ZooKeys* 441: 103-118. DOI: [10.3897/zookeys.441.7503](https://doi.org/10.3897/zookeys.441.7503)
- Kahanpää J, Salmela J (Eds) (2014) Checklist of the Diptera of Finland. *ZooKeys special issue*. 441. Pensoft, 408 pp. URL: http://zookeys.pensoft.net/browse_journal_issue_documents.php?issue_id=603
- Kjaerandsen J (2015) Checklist of Nordic fungus gnats (Diptera: Bolitophilidae, Diadocidiidae, Ditomyiidae, Keroplatidae, Mycetophilidae and Sciarosoma). *Fungus Gnats Online*, release date 2012 5 01 1.0: 1. URL: <http://sciarioidea.info/node/48341>
- Kjaerandsen J, Kurina O, Olafsson E (2007) The fungus gnats of Iceland (Diptera, Keroplatidae & Mycetophilidae). *Insect Systematics & Evolution, Supplement* 64: 61-96.
- Kjaerandsen J, Martinsson S, Hedmark K, Evenhuis NL (2009) On the genus *Urytalpa* Edwards (Diptera: Keroplatidae) in the Nordic and Nearctic regions, with fixation of a new type species and a key to world males. *Zootaxa* 2160: 29-50.
- Kjaerandsen J, Hedmark K, Kurina O, Polevoi AV, Okland B, Goetmark F (2007) Annotated checklist of fungus gnats from Sweden (Diptera: Bolitophilidae, Diadocidiidae, Ditomyiidae, Keroplatidae and Mycetophilidae). *Insect Systematics & Evolution, Supplement* 65: 1-165.
- Kurina O, Õunap E, Pöldmaa K (2015) Two new *Neuratelia* Rondani (Diptera, Mycetophilidae) species from Western Palaearctic: a case of limited congruence between morphology and DNA sequence data. *ZooKeys* 496: 105-129. DOI: [10.3897/zookeys.496.9315](https://doi.org/10.3897/zookeys.496.9315)
- Latreille PA (1805) *Histoire naturelle, générale et particulière des crustacés et des insectes*. Tome quatorzième, Paris 14: 1-432. [In French]. URL: <http://www.biodiversitylibrary.org/item/53501#page/754/mode/1up>
- Lundström C (1906) Beiträge zur Kenntnis der Dipteren Finnlands. I. Mycetophilidae. *Acta Societatis pro Fauna et Flora Fennica* 29 (1): 1-50.
- Marshall SA (2012) *Flies: The Natural History and Diversity of Diptera*. FireFly Books, 616 pp. [ISBN 1770851003]
- Matile L (1975) Révision des Asindulum et des Macrorrhyncha de la région paléarctique (Dipt., Mycetophilidae). *Annales Société Entomologique de France* (n. s.) 11: 491-515. [In French]. URL: http://www.online-keys.net/sciarioidea/add01/Matile_1975_Macrorrhyncha_Asidulum.pdf
- Økland B, Zaitzev AI (1997) Mycetophilids (Diptera, Sciaroidea) from southeastern Norway. *Fauna norvegica ser. B* 44: 27-37.
- Pape T, Bickel D, Meier R (2009) *Diptera Diversity: Status, Challenges and Tools*. Brill, Leiden, 460 pp. [ISBN 9789004148970]
- Plassmann E (1990) Fünf neue Pilzmücken aus Schweden (Diptera, Nematocera, Mycetophilidae). *Nachrichtenblatt der Bayerischen Entomologen* 39: 61-64. [In German].
- Salmela J, Suuronen A (2014) A new *Neoplatyura* Malloch from Finland (Diptera, Keroplatidae). *Biodiversity Data Journal* 2 (1323): 1-10. DOI: [10.3897/BDJ.2.e1323](https://doi.org/10.3897/BDJ.2.e1323)

- Salmela J, Kaunisto K, Vahtera V (2014) Unveiling of a cryptic *Dicranomyia* (*Idiopyga*) from northern Finland using integrative approach (Diptera, Limoniidae). *Biodiversity Data Journal* 2: e4238: 1-27. DOI: [10.3897/BDJ.2.e4238](https://doi.org/10.3897/BDJ.2.e4238)
- Ševčík J (2004) New data on Sciarioidea (Diptera) from the Czech and Slovak Republics, with descriptions of seven new species of Mycetophilidae. *Casopis Slezského zemského muzea, Serie A, Vedy prirodni* 53: 49-74.
- Ševčík J (2005) New records of *Sciophila* Meigen from the Czech and Slovak Republics (Diptera: Mycetophilidae). *Cas. Slez. Muz. Opava* 54: 69-74. URL: http://www.online-keys.net/sciarioidea/2000/Sevcik_2005_Sciophila.pdf
- Ševčík J (2010) Czech and Slovak Diptera associated with fungi. Silesian Museum, Opava, 112 pp. URL: http://www.online-keys.net/sciarioidea/add01/Sevcik_2006%20Diptera_reared_from_fungi.pdf [ISBN 978-80-86224-84-8]
- Ševčík J, Kurina O (2011a) Fungus gnats (Diptera: Sciarioidea) of the Gemer region (Central Slovakia): Part 1 – Bolitophilidae, Diadocidiidae, Ditomyiidae and Keroplatidae. *Čas. Slez. Muz. Opava (A)* 60: 11-23. DOI: [10.2478/v10210-011-0003-x](https://doi.org/10.2478/v10210-011-0003-x)
- Ševčík J, Kurina O (2011b) Fungus gnats (Diptera: Sciarioidea) of the Gemer region (Central Slovakia): Part 2 – Mycetophilidae. *Čas. Slez. Muz. Opava (A)* 60: 97-126. DOI: [10.2478/v10210-011-0011-x](https://doi.org/10.2478/v10210-011-0011-x)
- Ševčík J, Roháček J (2008) Fungus gnats (Diptera: Mycetophilidae and Keroplatidae) reared from grass and sedge tussocks in the Czech Republic. *Casopis Slezského Muzea v Opava (A)* 57: 175-178.
- Søli G, Kjaerandsen J (2008) Additions to the Norwegian fauna of fungus gnats (Diptera, Mycetophilidae). *Norwegian Journal of Entomology* 55: 31-41.
- Søli G, Rindal E (2012) Fungus gnats (Diptera, Mycetophilidae) from Finnmark, northern Norway. *Norwegian Journal of Entomology* 59: 158-181. URL: <http://www.entomologi.no/journals/nje/2012-2/pdf/nje-vol59-no2-158-181-soli.pdf>
- Stackelberg AA (1943) New Palaearctic fungus gnats (Diptera, Fungivoridae). *Proceedings of the Royal Entomological Society, London (B)* 12: 167-171. DOI: [10.1111/1/j.1365-3113.1943.tb00735.x](https://doi.org/10.1111/1/j.1365-3113.1943.tb00735.x)
- Tuomikoski R (1966) Generic taxonomy of the Exechiini (Dipt., Mycetophilidae). *Annales Entomologici Fennici* 32: 159-194.
- Winnertz J (1864) Beitrag zu einer Monographie der Pilzmücken. *Verhandlungen der Zoologisch-Botanischen Gesellschaft in Wien* 13: 637-964. [In German].
- Zaitzev AI (1982) Gribnye komary roda *Sciophila* Meig. (Diptera, Mycetophilidae) Golarktiki. [Holarctic fungus gnats of the genus *Sciophila* Meig.]. Nauka, Moscow, 75 pp. [In Russian].
- Zaitzev AI (2006) New and little known species of the subfamily Sciophilinae (Diptera, Mycetophilidae) from Russian Far East. *Far Eastern Entomologist* 161: 1-4. URL: <http://www.biosoil.ru/fee/2006/N-161/N-161.pdf>
- Zaitzev AI, Polevoi AV (1995) New species of fungus gnats (Diptera: Mycetophilidae) from the Kivach Nature Reserve, Russian Karelia. *Entomologica Fennica* 6: 185-195.